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JOINT EXAMINATION

1. Background and rationale

Impaired internal rotation of the hip is a reproducible sign of hip osteoarthritis. We will assess internal and external rotation of the hip to identify participants with a high probability of having hip OA. This test will also be useful in the analysis phase for discriminating knee pain from hip pain referred to the knee.

As part of the knee examination, we will administer standard questions about knee symptoms. These questions are based on the ones asked at the baseline Health ABC examination. Those who report frequent, or activity-specific, knee symptoms will be scheduled for an x-ray examination.

2. Equipment and supplies

- Long-armed goniometer

3. Safety and exclusions

Do not assess range of motion on hips with total hip replacement.

4. Participant preparation

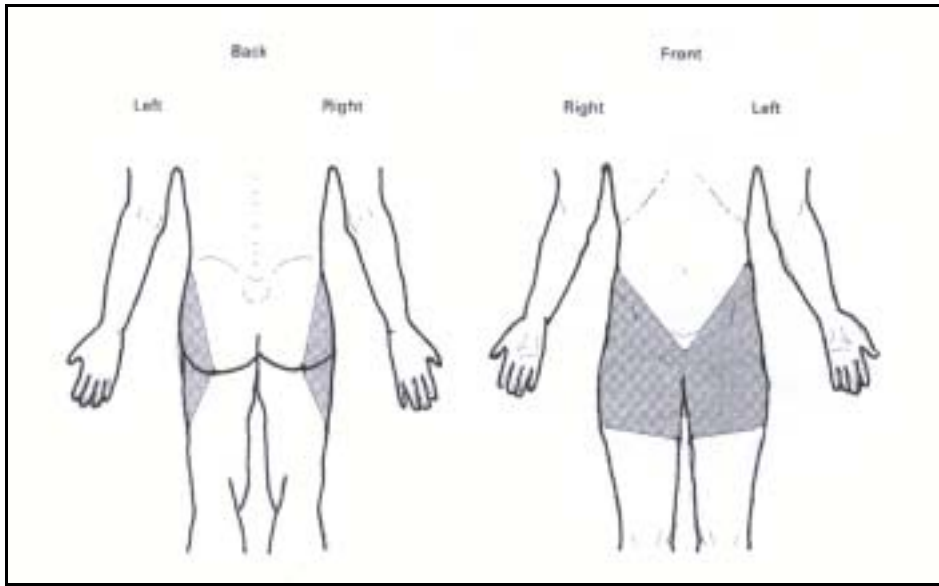
Knee pain questions can be asked at any time during the Year 6 clinic visit. The participant should be seated on the edge of an exam table, with their lower legs able to move freely.

5. Detailed examination and measurement procedures

5.1 Hip symptoms assessment

Questions will be asked of participants regarding hip pain.

Q1. Now I am going to ask you a question about pain in your hip. In the past 12 months, have you had hip pain on most days for at least one month? This includes pain in the groin and either side of the upper thigh. Do not include pain that was only in your lower back or buttocks. (Show Card #1 – figure with picture of hip. See below)



If "Yes," ask:

Q1a. In the past 12 months, have you had this pain in the right hip, left hip, or both hips?

and

Q1b. How severe was that pain usually?

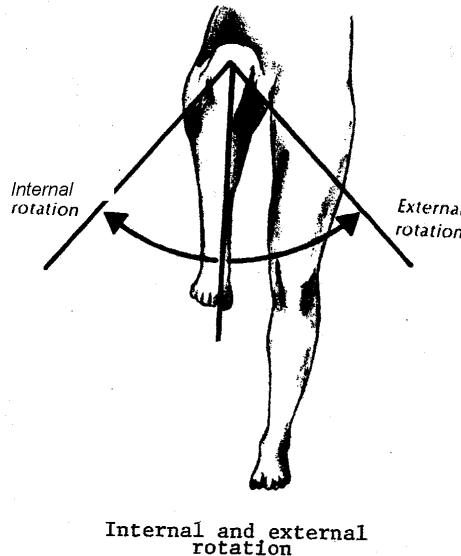
Q1c. Now, please think about the past 30 days. In the past 30 days how much pain have you had in your hips during each situation I will describe? How much pain have you had while . . ?

- a) Walking on a flat surface
- b) Going up or down stairs
- c) At night while in bed
- d) Standing upright
- e) Putting on socks
- e) Getting in or out of a chair (a relatively hard, supportive chair)
- f) Getting in or out of a car

Read each activity separately. Show Response Card or read the answer choices: None, Mild, Moderate, Severe, and Extreme.

5.2 Hip Examination/Internal Rotation

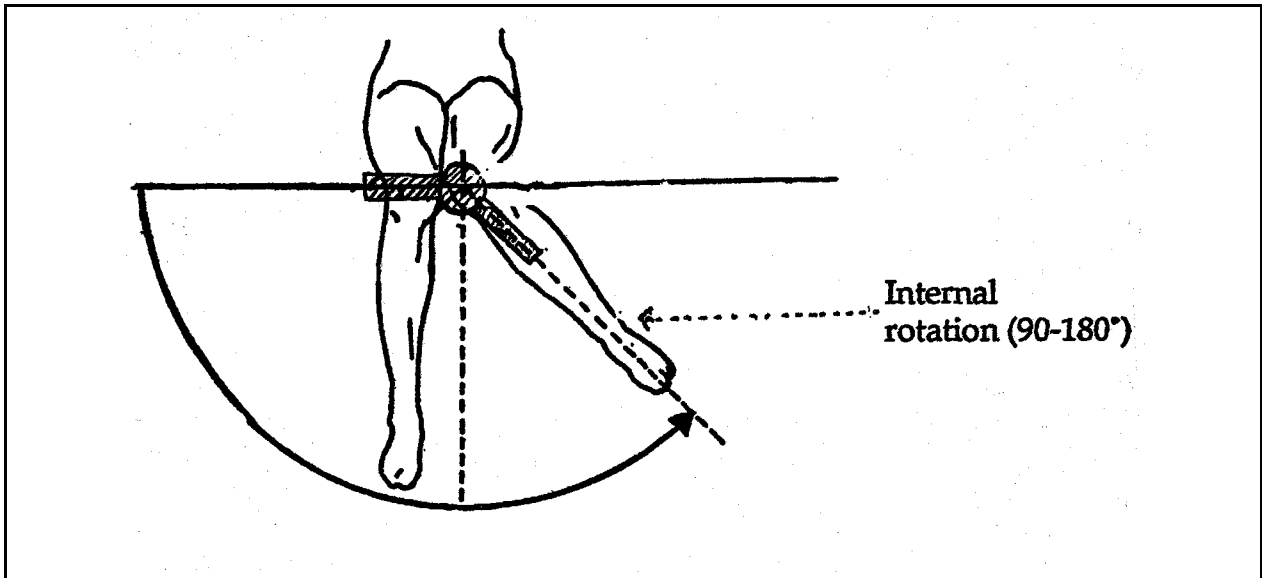
Internal rotation of the hip is the movement made by the femoral head in the acetabulum when the hip and the knee are both flexed to 90° and the lower leg is moved laterally away from the midline of the body (See figure below).



Goniometry for hip internal rotation. Internal rotation will be measured in degrees using a goniometer. Goniometry is the measurement of angles, in our study the measurement in degrees of the internal rotation of the hip. The measurement is taken while the pivot, or axis, of the goniometer is over the axis of motion of the joint, in this case, the patella. Since the axis of motion may shift somewhat when the joint is moved, care should be taken to be sure the pivot of the goniometer is positioned as closely as possible over the axis of motion when the measurement is taken.

We will measure free and easy range of passive motion, which is defined as movement of the joint by the examiner up to the point of resistance to movement, or to the point where joint pain prevents further movement. For some participants this will mean moving the joint beyond the onset of mild discomfort.

IMPORTANT: For purposes of recording, the goniometer measurement will always be an angle between 90° and 180°. Always read the angle from the black numbered scale at the bottom of the goniometer dial. The 'stationary' arm of the goniometer is the arm attached to the circular dial calibrated in degrees. The moveable arm pivots around the circular dial.

**Exclusions:**

Before you examine the left hip, ask the participant if they have ever had a hip replacement on their left hip. If they answer "yes," check the "yes" response option on the Joint Examination: Hip (Internal Rotation) Form (page 44 of the Year 6 Clinic Visit Workbook), do not do a hip exam on the left hip, and go to Question #4: "Have you ever had a hip replacement on your right hip?" If the participant answers "yes," check the "yes" response option, do not examine the right hip, and go on to the hand joint assessment.

Hip Examination:

1. Participant sits on the exam table with legs over the side and knees flexed to 90; ° knees about 8 inches apart. Participant's hands are resting on knees to help hold the goniometer in place.

Ask participant to keep "equal weight on both buttocks and their bottom on the table" as you move their leg. Kneel, crouch or sit in front of participant.

2. Have the participant hold the goniometer with the pivot centered over the middle of the patella of the left knee and the stationary arm on a line between the patellae of the right and left knees. (See figure above.) Ask them to keep the pivot centered over the knee while you are moving their leg.
3. Hold the left leg at the shin with your left hand and put your right hand on the top of the left knee to stabilize the joint. Before the motion, say:

"I'm going to rotate your leg by pulling your lower leg up and outward. As I move your leg, tell me if you feel any pain in your hip or groin."

Move the left leg (and the arm of the goniometer) counter-clockwise to the limit of motion or until the participant complains of pain. Buttocks should remain on the table and the stationary arm of the goniometer parallel to the table top. Apply firm pressure to the top of the knee to keep it from moving.

The resistance encountered at the limit of normal motion is typically "firm" - a firm or springy sensation that has some give as muscle is stretched. The typical limit of motion, as measured by the goniometer, is about 135° to 145°.

After reaching the limit of motion ask:

"Did that hurt in your hip or groin?"

PLEASE NOTE: The examiner stands to the side of the participant and pulls the lower leg up and outward. Use the flat part of your hand or the 'V' between thumb and first finger to apply pressure. If pressure is applied with the finger tips, this may hurt the participant's lower leg.

PLEASE NOTE: For some very large participants, it may be necessary to have one examiner hold the knee to stabilize it and the other to rotate the hip.

4. Read the angle from the black-numbered scale at the bottom of the goniometer dial (between 90° and 180; ° full ROM is usually not more than about 135-145°).
5. Record pain and degrees of motion.
6. Reverse examiner hand and goniometer positions for the right leg. Align the stationary arm of the goniometer on a line between the patellae of the knees with the pivot over the right patella.
7. Move the right leg (and the descending arm of the goniometer) clockwise to the limit of motion or until they complain of pain. Before the motion, say

"As I move your leg, tell me if you feel any pain in your hip or groin."

8. After reaching the limit of motion ask:

"Did that hurt in your hip or groin?"

Many participants will feel some discomfort at the extreme range of motion, but not real pain.

9. Record pain and degrees of motion. The range of possible angles is the same as for the left leg.
10. Abnormal internal rotation is movement of less than 15° or movement with definite pain. (Subtract 90 from the measured angle to get degrees of rotation.)

5.3 Knee symptoms assessment

Questions will be asked of participants regarding knee pain and stiffness. The participants' answers will be used to determine whether or not they are eligible to receive an x-ray evaluation, and as study data on knee symptoms. X-ray exams will be bilateral whether or not the symptoms are bilateral.

1. Ask the general arthritis question:

Q1. In the past 12 months, has a doctor told you that you have osteoarthritis or degenerative arthritis? We are specifically interested in learning about osteoarthritis or degenerative arthritis that was diagnosed for the first time in the past 12 months.

If the participant answers "No," "Don't know" or refuses, go to the Question #2.

If the participant answers "Yes," ask:

Q1a. Did the doctor say it was . . .

- i. Osteoarthritis or degenerative arthritis in your knee?
- ii. Osteoarthritis or degenerative arthritis in your hip?

Q1b. Do you take any medicines for arthritis or joint pain?

2. Introduce the knee exam:

Now I am going to ask you some questions regarding any pain or stiffness in your joints. I will also examine your knees.

These questions are about pain, aching or stiffness in or around your knee. This includes the front, back, and sides of the knee.

First I'll ask about your left knee.

3. Ask knee pain questions. Do not include symptoms that are only felt in the thigh, calf or parts of the leg away from the knee.

Q2. In the past 12 months, have you had any pain, aching, or stiffness in your left knee?

If the participant answers "No," "Don't know" or refuses, go to the Question #3.

If the participant answers "Yes," ask:

Q2a. In the past 12 months, have you had pain, aching, or stiffness in your left knee on most days for at least one month?

"On most days for at least one month" should be defined as ≥ 15 days of any 30-day period. The days with symptoms need not be consecutive. Symptoms may vary in intensity from day to day.

If the participant answers "Yes," the participant may be eligible for a knee x-ray (see Question #2a on page 45 in the Year 6 Clinic Visit Workbook). Ask:

Q3. Now, please think about the past 30 days. In the past 30 days, have you had any pain, aching or stiffness in the left knee?

If the participant answers "No or Don't Know" or refuses, go to Question #4 for the right knee.

a. If the participant answers, "Yes," ask Question #3a and #3b.

Q3a. In the past 30 days, have you had pain, aching, or stiffness in your left knee on most days?

If the participant answers, "Yes," the participant may be eligible for a knee x-ray (see Question #2a on page 45). "On most days" should be defined as ≥ 15 of the last 30 days. The days with symptoms need not be consecutive. Symptoms may vary in intensity from day to day.

Q3b. In the past 30 days, how much pain have you had in your left knee for each activity I will describe. How much pain have you had while . . . ?

- a) Walking on a flat surface
- b) Going up or down stairs
- c) At night while in bed
- d) Standing upright
- e) Getting in or out of a chair (a relatively hard, supportive chair)
- f) Getting in or out of a car

Read each activity separately. Show Response Card or read the answer choices: None, Mild, Moderate, Severe, and Extreme. **If the answer for any of these activities is moderate, severe, or extreme pain, the participant may be eligible for an x-ray (see Question #2a on page 45).**

If the participant does not do the activity and can't answer, check "Don't know."

3. Repeat Questions #2 and #3, this time for the right knee (Q4, 4a, Q5, 5a, 5b).

4. Ask Questions #6 and 7 regardless of knee symptoms reported above.

Q6. In the past 30 days, have you limited your activities because of pain, aching, or stiffness in your knees?

If the participant answers "Yes," ask them:

Q6a. On how many days did you limit your activities because of pain, aching, or stiffness?

Include activity limitations that last for all or part of the day, and limitations that have occurred on one day or more. Sum the days with limitations regardless of the type of activity which is limited on different days. Include long-standing, or chronic, limitation as well as those that have begun recently. Include limitations that are due in part, or in whole, to knee symptoms.

Q7. In the past 30 days, have you changed, cut back or avoided any activities in order to avoid knee pain or reduce the amount of knee pain?

This question is designed to identify people who, while saying they are not limiting their activities because of knee pain, are in fact doing things differently or avoiding certain activities in order to avoid having knee pain, or to reduce the pain.

6. Assess whether or not the participant should be scheduled for a knee x-ray.

Q9. Is the participant eligible for a follow-up knee x-ray?

(Refer to the Data from Prior Visits Report. Our goal is to obtain follow-up knee x-rays in Years 5 and 6 on as many participants as possible who had a baseline x-ray at the Year 2 or 3 visit. However, for financial reasons we may not be able to include follow-up x-rays in everyone. We will take a number of factors into account in determining which participants are put on the follow-up list. The beam angle(s) that should be used for follow-up PA views on each knee will be indicated on the Data from Prior Visits Report.)

If “Yes,” explain knee OA substudy and schedule participant for a knee x-ray. Fill out a Knee X-ray Tracking Form for every participant who is eligible for a follow-up knee x-ray – whether the participant agrees to the knee x-ray or refuses. If the participant is eligible for a follow-up knee x-ray, skip Question #2 and go on to Question #3.

Q2. Did the participant have knee symptoms that met eligibility criteria for a knee x-ray in Year 2, Year 3, Year 4, or Year 5?
 (Refer to the Data from Prior Visits Report)

<p>If “Yes,”</p> <p>Q2a. Does the participant have knee symptoms at this Year 6 clinic visit? Refer to the Questions #2, 3, 4, and 5 in the Year 6 Clinic Visit Workbook. The participant must have at least one asterisked (*) answer. If “No,” STOP. Do NOT schedule a knee x-ray. If “Yes,”</p> <p>Q2b. Did the participant have a knee x-ray in Year 2, Year 3, Year 4, or Year 5? Refer to the Data from Prior Visits Report. If “Yes,” do NOT schedule an x-ray. If “No,” Schedule a knee x-ray. <u>Fill out a Knee X-ray Tracking Form whether or not the participant agrees to have a knee x-ray.</u></p>	<p>If “No,”</p> <p>Q2a. Does the participant have knee symptoms at this Year 6 clinic visit?</p> <p>Refer to the Questions #2, 3, 4, and 5 in the Year 6 Clinic Visit Workbook. The participant must have at least one asterisked (*) answer. If “No,” STOP. Do NOT schedule a knee x-ray. If “Yes,” schedule a knee x-ray. <u>Fill out a Knee X-ray Tracking Form whether or not the participant agrees to have a knee x-ray.</u></p>
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7. Assess whether or not the participant should be scheduled for a knee MRI.

Q3. Is the participant eligible for a follow-up knee MRI?
 (Refer to the Data from Prior Visits Report. Participants are selected for follow-up MRI from among those who had a baseline MRI at the Year 2 or Year 3 visits. Not all participants who had a baseline MRI will be asked to obtain a follow-up. Some of those who get a follow-up MRI will have both knees imaged and others will have a follow-up on only one knee, based on what will give the greatest scientific yield.)

If “Yes,” explain knee OA substudy and schedule participant for a knee MRI. Fill out a Knee MRI Tracking Form for every participant who is eligible for a follow-up knee MRI – whether the participant agrees to the knee MRI or refuses.

6. Alert values/follow-up reporting to participants

There are no alert values for this examination.

Impaired internal rotation of the hip is less than 15,° (or less than 105° based on the goniometer measurement made in this study). If the participant has an impaired range of motion, or if the participant has hip pain during the internal rotation exam, and also has hip pain on most of a recent month they may have hip OA according to the American College of Rheumatology clinical criteria. Studies show that this is a common finding in people with osteoarthritis of the hip, but that it also occurs in people who do not have osteoarthritis of the hip. Limited internal rotation without hip pain is of uncertain significance.

Treatments for OA include medications to reduce pain and inflammation (aspirin and nonsteroidal antiinflammatory drugs) exercise, and for the knee, weight control. Provide those with any of the above findings with a copy of the NIH Age Page “Arthritis Advice” (Appendix 1)

7. Quality assurance

7.1 Training

Experience in musculoskeletal examinations is preferred but not required. Training includes:

- Read and study operations manual chapter
- Attend training session
- Practice on elderly volunteers (elderly participants are much more likely to have the findings) and compare findings with other examiners.
- Discuss problems with a study rheumatologist

7.2 Certification requirements

- Fulfills training requirements
- Conducts exam on two elderly participants with more experienced examiner and reaches consensus on findings

7.3 Quality control checklist

Hip Pain Assessment

- ☐ Correctly asks questions regarding hip pain and shows card #1.
- ☐ Reads response options for pain severity question (Q1b)

- ☐ Reads activities separately for Q1c
- ☐ Reads answer categories and/or used card #2 for Q1c
- ☐ Follows skip patterns correctly
- ☐ Accurately records participant's responses on clinic visit workbook

Hip exam

- ☐ Participant sitting on edge of exam table, lower leg able to move freely
- ☐ Goniometer positioned properly, participant instructed to hold in place
 - Pivot remains over patella during the exam
- ☐ Left leg tested first
- ☐ Examiner moves lower leg counterclockwise
 - right hand on left knee, left hand grasping shin and arm of goniometer
- ☐ Participant asked about hip pain before and after movement
- ☐ Examiner pushes limb to limit of motion or until participant complains of discomfort
- ☐ Participants buttocks do not rise up off table
- ☐ Record range of motion in degrees and pain for left
- ☐ Reverse goniometer and hand position and repeat for the right leg
- ☐ Record range of motion in degrees and pain for right

Knee Pain Assessment

- ☐ Correctly asks questions regarding knee pain and stiffness.
 - ☐ Reads activities separately for Q3b and Q5b.
 - ☐ Reads answer categories and/or used card #2 for Q3b and Q5b.
- ☐ Follows skip patterns correctly
- ☐ Accurately records participant's responses on clinic visit workbook

APPENDIX 1 NIH Arthritis Advice

Arthritis Advice

Half of all people age 65 and older have arthritis. There are over 100 different forms of arthritis and many different symptoms and treatments. We do not know what causes most forms of arthritis. Some forms are better understood than others. Arthritis causes pain and loss of movement. It can affect joints in any part of the body. Arthritis is usually chronic, meaning it can occur over a long period of time. The more serious forms can cause swelling, warmth, redness, and pain. The three most common kinds of arthritis in older people are osteoarthritis, rheumatoid arthritis, and gout.

Common Forms of Arthritis

Osteoarthritis (OA), at one time called degenerative joint disease, is the most common type of arthritis in older people. Symptoms can range from stiffness and mild pain that comes and goes to severe joint pain and even disability.

OA usually affects the hands and the large weight-bearing joints of the body: the knees and hips. Early in the disease, pain occurs after activity and rest brings relief; later on, pain occurs with very little movement, even during rest.

Scientists think that several factors may cause OA in different joints. OA in the hands or hips may run in families. OA in the knees is linked with being overweight. Injuries or overuse may cause OA in joints such as knees, hips, or hands.

Rheumatoid arthritis (RA) can be one of the more disabling forms of arthritis. Signs of RA often include morning stiffness, swelling in three or more joints, swelling of the same joints on both sides of the body (both hands, for example), and bumps (or nodules) under the skin most commonly found near the elbow. RA can occur at any age and affects women about three times more often than men.

Scientists don't know what causes RA but think it has something to do with a breakdown in the immune system, the body's defense against disease. It is also likely that people who get RA have certain inherited traits (genes) that cause a disturbance in the immune system.

Gout occurs most often in older men. It affects the toes, ankles, elbows, wrists, and hands. An acute attack of gout is very painful. Swelling may cause the skin to pull tightly around the joint and make the area red or purple and very tender. Medicines can stop gout attacks, as well as prevent further attacks and damage to the joints.

Treatments

Treatments for arthritis work to reduce pain and swelling, keep joints moving safely, and avoid further damage to joints. Treatments include medicines, special exercise, use of heat or cold, weight control, and surgery.

Medicines help relieve pain and reduce swelling. Acetaminophen or ACT should be the first drug used to control pain in patients with osteoarthritis (OA). Patients with OA who don't respond to ACT and patients with RA and gout are most commonly treated with nonsteroidal anti-inflammatory drugs such as ibuprofen. People taking medicine for any form of arthritis should limit the amount of alcohol they drink. (For more information, see the *Age Page* "Arthritis Medicines.")

Exercise, such as a daily walk or swim, helps keep joints moving, reduces pain, and strengthens muscles around the joints. Rest is also important for the joints affected by arthritis. Physical therapists can develop personal programs that balance exercise and rest.

Many people find that soaking in a warm bath, swimming in a heated pool, or applying **heat or cold** to the area around the joint helps reduce pain. **Controlling or losing weight** can reduce the stress on joints and can help avoid further damage. When damage to the joints becomes disabling or when other treatments fail to reduce pain, your doctor may suggest **surgery**. Surgeons can repair or replace damaged joints with artificial ones. The most common operations are hip and knee replacements.

Unproven Remedies

Arthritis symptoms may go away by themselves but then come back weeks, months, or years later. This may be why many people with arthritis try quack cures or remedies that have not been proven instead of getting medical help. Some of these remedies, such as snake venom, are harmful. Others, such as copper bracelets, are harmless but also useless. The safety of many quack cures is unknown.

Here are some tipoffs that a remedy may be unproven: claims that a treatment like a lotion or cream works for all types of arthritis and other diseases too; scientific support comes from only one research study; or the label has no directions for use or warnings about side effects.

Common Warning Signs of Arthritis

- Swelling in one or more joint(s)
- Morning stiffness lasting 30 minutes or longer
- Joint pain or tenderness that is constant or that comes and goes
- Not being able to move a joint in the normal way
- Redness or warmth in a joint
- Weight loss, fever, or weakness and joint pain that can't be explained

If any one of these symptoms lasts longer than 2 weeks, see your regular doctor or a doctor who specializes in arthritis (a rheumatologist). The doctor will ask questions about the history of your symptoms and do a physical exam. The doctor may take x-rays or do lab tests before developing a treatment plan.

Resources

For more information on arthritis contact:

National Institute of Arthritis and Musculoskeletal and Skin Diseases

Building 31, Room 4C05

Bethesda, MD 20892

(301) 496-8188

The Arthritis Foundation

P.O. Box 19000

Atlanta, GA 30325

(800) 283-7800

For a list of free publications from the National Institute on Aging (NIA), contact the NIA Information Center, P.O. Box 8057, Gaithersburg, MD 20898-8057; 1-800-222-2225;

(1-800-222-4225 TTY); e-mail: niainfo@access.digex.net

National Institute on Aging

APPENDIX 2 Report of Knee x-ray Findings to Participants



HABC Enrollment ID #						Date of reading:					
H							/		/		
						Month		Day		Year	

KNEE RADIOGRAPH PARTICIPANT REPORT

Participant name: _____

This report describes what the HEALTH ABC arthritis specialist (rheumatologist) found when they looked at your knee x-rays. If you have any questions about this report, please contact your doctor. This exam was conducted for research purposes only, and was not performed to diagnose any medical conditions.

The examiners were looking for the following:

1. **Osteoarthritis** develops when the cartilage in the joints starts to wear away. This is usually accompanied by changes in the bone near the joint which can be seen on an x-ray. It is the most common form of arthritis.
2. **Osteophytes** are bony growths which form around a joint affected by osteoarthritis.
3. **Joint space** narrowing is a decrease in the space between the joints which occurs when the cartilage wears away.
4. **Cysts** are fluid-filled sacs in the bone near joints affected by osteoarthritis.

① OSTEOARTHRITIS

A. Tibiofemoral joint **LEFT KNEE** **RIGHT KNEE**

Normal	<input type="checkbox"/>	<input type="checkbox"/>
Mild (definite osteophytes)	<input type="checkbox"/>	<input type="checkbox"/>
Moderate (osteophytes, definite loss of joint space, possible sclerosis and cysts)	<input type="checkbox"/>	<input type="checkbox"/>
Severe (large osteophytes, moderate to severe loss of joint space, definite sclerosis, cysts, or subluxation)	<input type="checkbox"/>	<input type="checkbox"/>

B. Patellofemoral joint

Normal	<input type="checkbox"/>	<input type="checkbox"/>
Mild (definite osteophytes)	<input type="checkbox"/>	<input type="checkbox"/>
Moderate (osteophytes, definite loss of joint space)	<input type="checkbox"/>	<input type="checkbox"/>
Severe (large osteophytes, moderate to severe loss of joint space, subluxation)	<input type="checkbox"/>	<input type="checkbox"/>

② OTHER FINDINGS

Chondrocalcinosis	<input type="checkbox"/>	<input type="checkbox"/>
Paget's disease	<input type="checkbox"/>	<input type="checkbox"/>
Loose bodies (osteochondromatosis)	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>

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